

14

n-pentane

99-7

X)

1-difluoromethoxy  
1,1,2,2-tetrafluoroethyl  
difluoromethyl ether  
( $\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ );  
n-hexane

15-99

85-1.

### REMARKS

Claims 1-3, 10, 12-18 and 22-27 are rejected. Claims 18 and 25 are cancelled and claims 1, 2, 12 and 23 amended. Support for the amendments can be found throughout the application, for instance at page 6 (line 11) of the specification and in the claims as originally filed. No new matter is added. Claims 1-3, 10, 12-17, 22-24 and 26-27 are submitted for further consideration. Applicants respectfully request reconsideration and withdrawal of all rejections.

### Claim Rejections - 35 U.S.C. § 112, Second Paragraph

Claims 12-16, 23, 24 and 27 are rejected as being indefinite. It is alleged that in claims 14 and 15, it is unclear how to interpret the water limitation when thermoplastic polymers are produced. Applicants respectfully point out that claim 15 is dependent on claim 14 which depends from claim 12. Claim 12 is dependent on claim 1, which is concerned with polyurethane foams rather than thermoplastic polymers. Accordingly, thermoplastic foams are not included as part of claims 14 and 15.

It is also alleged that in claims 15 and 16, it is unclear how to interpret the polyol limitation when thermoplastic polymers are produced. Applicants respectfully point out that thermoplastic polymers are not part of claim 15, as explained in the preceding

paragraph. In addition, claim 16 is dependent on claim 14 which depends from claim 12. As explained above, thermoplastic polymers are not part of 12, and therefore, thermoplastic polymers are also not part of claim 16.

Finally, it is alleged that in claim 23, the wrong structure is specified for composition X). Applicants respectfully urge that the rejection is moot in light of the amendment of claim 23 indicated herein. Applicants urge that all claims are clear and definite.

#### **Claim Rejections - 35 U.S.C. § 112, Second Paragraph**

Claims 1-3, 10, 12-18, 24 and 25 are rejected as being inadequately described in the specification. Applicants respectfully urge that the rejection is moot in light of the amendments of the claims to recite "polyurethanes", as indicated herein. Applicants urge withdrawal of the rejection.

#### **Claim Rejections - 35 U.S.C. § 102**

Claims 23 and 27 are rejected under 35 U.S.C. §102(b) as being anticipated by Klug et al. It is alleged in the Office Action that the claims have not been amended in accordance with the arguments of the Response dated April 1, 2002 (the "Response"). Applicants respectfully note that such allegation appears to be directed to the arguments at page 15 of the Response, wherein it is pointed out that according to the data of the previously submitted Declaration of Dr. Giampiero Basile dated December 5, 2002, foams made with the compositions of Klug et al. have a density higher than 30 kg/cm<sup>3</sup> (i.e., the foam density of CFC 11 and the selected foaming agents of the present invention). Applicants respectfully submit that the claims and in particular claim 23 have been

amended in accordance with such arguments, as indicated herein. Support can be found, e.g., on page 34 of the application. Therefore, in that Klug et al. is unable to teach or suggest each and every element of the claimed invention, in particular a foam density of about 30 kg/cm<sup>3</sup>, Applicants urge withdrawal of the rejection.

#### **Claim Rejections - 35 U.S.C. § 103**

Claims 1-3, 12, 13 and 24 are rejected under 35 U.S.C. §103(a) as being obvious over Klug et al. It is alleged that it would have been obvious to control foam density by adjusting characteristics such as the amount of blowing agent utilized.

Applicants respectfully disagree. Applicants wish to point out that in order to obtain a meaningful comparison between CFC 11 and a blowing agent substitute for CFC 11, the moles of the blowing agent and CFC 11 must be equal. It is to be noted that blowing properties are related to the compound in the gas phase, and thus, a foaming agent compound for the replacement of CFC 11 is expected to display in the gas phase the same properties as CFC 11. Applicants therefore again point to the Declaration of Dr. Giampiero Basile submitted with the Response dated December 5, 2000, which demonstrates that Klug et al. discloses compositions unsuitable as substitutes for CFC 11, since when tested at the same molar amount as CFC 11, the compositions are unable to provide foams with comparable physical properties. Applicants refer in particular to Table 2 at page 7 of the filed Declaration, where it can be clearly seen that:

- Examples 1-2 produce foams completely expanded, having a density higher than 30 kg/cm<sup>3</sup>, and having a much too coarse cell size distribution.

- Examples 3-5 produce foams not completely expanded, having a density higher than  $200 \text{ kg/cm}^3$ , and having a much too coarse cell size distribution.
- Examples 6-7 produced no foam as the compositions did not expand.

With such results, it would be quite clear to those of ordinary skill in the art that foam density cannot be controlled by simply adjusting the amount of blowing agent.

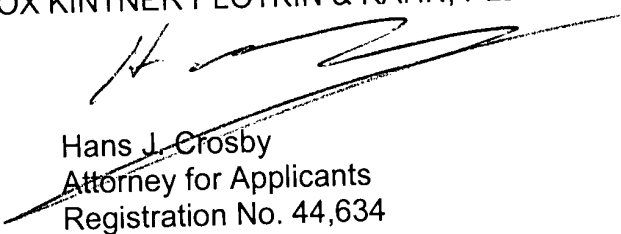
Applicants emphasize in particular that in Examples 1-2, the foam is completely expanded under the same conditions used for expanding foams wherein CFC 11 is the blowing agent. As is clear from the Examples, the density is higher than that of a foam produced with CFC 11. Regarding Examples 3-5, Applicants wish to point out that under those conditions used to obtain a fully expanded foam with CFC 11, the tested blowing agent (in the same molar amounts as CFC 11) results in an incompletely expanded foam. Clearly the tested blowing agent does not have the same performance as CFC 11, and thus, the blowing agents of Examples 3-5 cannot be considered substitutes for CFC 11. Finally, with reference to Examples 6-7, Applicants point out that the tested blowing agent does not expand, and therefore, no foam is formed. Indeed, even if additional amounts of the blowing agent are added, as is suggested in the Office Action, no foam may be obtained. Accordingly, it is quite clear that the Klug et al. reference is unable to teach or suggest any composition of the claimed invention that is able to provide for polyurethane foams having the same physical properties as CFC 11, when tested in a similar amount. Applicants request withdrawal of all rejections.

In view of the amendments and remarks above, Applicants respectfully submit that this application is in condition for allowance and request favorable action thereon.

In the event this paper is not considered to be timely filed, Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300, referencing Attorney Docket No. 108910-09024.

Respectfully submitted,

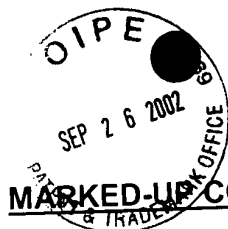
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Enclosures: Marked-Up Copy of Claim Amendments  
Petition for Extension of Time



**MARKED-UP COPY OF CLAIM AMENDMENTS**

**1 (Amended).** A process for foaming [polyurethane polymers and thermoplastic polymers] polyurethanes, comprising: adding to compositions used to make solid polymers azeotropic or near azeotropic foaming agent compositions as substitutes for CFC 11 to give a homogeneous foam having a density of about 30 kg/cm<sup>3</sup>, said foaming agent compositions based on difluoromethoxy-bis(difluoromethyl ether) and/or 1-difluoromethoxy-1, 1, 2, 2-tetrafluoroethyl difluoromethyl ether, said foaming agent compositions selected from the group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); n-pentane	1-95 99-5
II) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); iso-pentane	1-99 99-1
III) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); dimethyl ketone (acetone)	1-60 99-40
IV) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); 1,1,1,3,3-pentafluorobutane (CF <sub>3</sub> CH <sub>2</sub> CF <sub>2</sub> CH <sub>3</sub> , HFC 365 mfc)	1-99 99-1
V) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); 1,1,1,4,4,4-hexafluorobutane (CF <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub> , HFC 356 ffa)	1-40 99-60

VI)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); methoxymethyl methylether	1-96 99-14
VII)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); n-hexane	30-99 70-1
VIII)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ ); n-pentane	1-93 99-7
IX)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ ); dimethyl ketone (acetone)	30-99 70-1
X)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ ); n-hexane	15-99 85-1
XI)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ ); ethyl alcohol	5-99 95-1
XII)	difluoromethoxy-bis (difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); 1,1,1,3,3-pentafluorobutane ( $\text{CF}_3\text{CH}_2\text{CF}_2\text{CH}_3$ , HFC 365 mfc) a hydrocarbon selected from n-pentane or isopentane	1-64 98-1 1-35 and
XIII)	difluoromethoxy-bis (difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); 1,1,1,4,4,4-hexafluorobutane ( $\text{CF}_3\text{CH}_2\text{CH}_2\text{CF}_3$ , HFC 356 ffa)	1-22 98-43

a hydrocarbon selected from  
n-pentane or isopentane

1-35

wherein

- (1) in the foaming agent compositions II, III, IV, V and VI, up to 40% by weight of the difluoromethoxy-bis(difluoromethyl ether) is optionally substituted with 1-difluoro methoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether;
- (2) in the foaming agent composition IX, up to 40% by weight of 1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether is optionally substituted by difluoromethoxy-bis(difluoromethyl) ether;
- (3) in the foaming agent compositions I and VII, up to 50% by weight of difluoromethoxy-bis(difluoromethyl ether) is optionally substituted by 1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether;
- (4) in the foaming agent compositions VIII and X, up to 50% by weight of 1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether is optionally substituted with difluoromethoxy-bis(difluoromethyl) ether.

**2 (Amended).** The process of claim 1, wherein said foaming agent compositions are selected from the group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); n-pentane	25-95 75-5
II) difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); iso-pentane	25-98 75-2



III)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); dimethyl ketone (acetone)	20-60 80-40
IV)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); 1,1,1,3,3-pentafluorobutane ( $\text{CF}_3\text{CH}_2\text{CF}_2\text{CH}_3$ , HFC 365 mfc)	10-98 90-2
V)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); 1,1,1,4,4,4-hexafluorobutane ( $\text{CF}_3\text{CH}_2\text{CH}_2\text{CF}_3$ , HFC 356 ffa)	10-40 90-60
VI)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); methoxymethyl methylether	25-96 75-14
VII)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); n-hexane	35-98 65-2
VIII)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); n-pentane	25-93 75-7
IX)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); dimethyl ketone (acetone)	50-98 50-2
X)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether [( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ );] ( <u><math>\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}</math></u> ); n-hexane	25-98 75-2 and

XI)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); ethyl alcohol	10-98   90-2.
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**12 (Amended).** The [he] process according to claim 1, wherein for polyurethane foams the compositions are selected from the group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); n-pentane	1-95  99-5
II) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); iso-pentane	1-99  99-1
IV) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); 1,1,1,3,3-pentafluorobutane (CF <sub>3</sub> CH <sub>2</sub> CF <sub>2</sub> CH <sub>3</sub> , HFC 365 mfc)	1-99  99-1
V) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); 1,1,1,4,4,4-hexafluorobutane (CF <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub> , HFC 356 ffa)	1-40  99-60
VI) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); methoxymethyl methylether	1-96  99-14
VII) difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); n-hexane	30-99  70-1
VIII) 1-difluoromethoxy 1,1,2,2-tetrafluoroethyl	

	difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ ); n-pentane	1-93 99-7 and
X)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ ); n-hexane	15-99 85-1.

**23 (Amended).** Polyurethane polymer compositions comprising [foaming agents] as blowing agent substitutes of CFC-11 to give a homogenous foam having density of about 30 Kg/cm<sup>3</sup>, foaming agent azeotropic or nearly azeotropic compositions selected from the group consisting of:

		composition % by weight
I)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); n-pentane	1-95 99-5
II)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); iso-pentane	1-99 99-1
IV)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); 1,1,1,3,3-pentafluorobutane ( $\text{CF}_3\text{CH}_2\text{CF}_2\text{CH}_3$ , HFC 365 mfc)	1-99 99-1
V)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ ); 1,1,1,4,4,4-hexafluorobutane ( $\text{CF}_3\text{CH}_2\text{CH}_2\text{CF}_3$ , HFC 356 ffa)	1-40 99-60
VI)	difluoromethoxy bis(difluoromethyl ether) ( $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$ );	1-96

	methoxymethyl methylether	99-14
VII)	difluoromethoxy bis(difluoromethyl ether) (HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H); n-hexane	30-99  70-1 and
VIII)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF <sub>2</sub> OCF <sub>2</sub> CF <sub>2</sub> OCF <sub>2</sub> H); n-pentane	1-93  99-7
X)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether [(HCF <sub>2</sub> OCF <sub>2</sub> OCF <sub>2</sub> H);] <u>(HCF<sub>2</sub>OCF<sub>2</sub>CF<sub>2</sub>OCF<sub>2</sub>H);</u> n-hexane	15-99  85-1.